Decentralization and Government Provision of Public Goods: The Public Health Sector in Uganda

Draft

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Decentralization and Government Provision of Public Goods: The Public Health Sector in Uganda

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The Public Health Sector in Uganda

Abstract[1]

While many developing countries have devolved health care responsibilities to local governments in recent years, no study has examined whether decentralization actually leads to greater health sector allocative efficiency. This paper approaches this question by modeling local government budgeting decisions under decentralization. The model leads to conclusions not all favorable to decentralization and produces several testable hypotheses concerning local government spending choices. For a brief empirical test of the model we look at data from Uganda. The data are of a type seldom available to researchers – actual health budgets for the health sector in a developing country. The health budgets are disaggregated into specific types of activities based on a subjective characterization of each activity's "publicness." The empirical results provide preliminary evidence that district planners are allocating declining proportions of their budgets to public goods activities. They also provide strong support for the hypothesis that spillover effects cause spending on public goods in one district to reduce spending on public goods in neighboring districts.

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1. INTRODUCTION

Scant attention in the health economics literature has been paid to the efficiency implications of decisions to decentralize government service provision on government provision of health goods and services from the central government to lower levels of government. The literature instead has focused principally on identifying as being candidates for government provision those types of services which are both non-excludable and non-rivalrous in consumption. The most common examples include public or near public goods, such as immunizations, vector control, safe drinking water supply, sanitation, infectious disease control and health education; or goods that result in significant externalities, such as family planning, maternal and child health, and infant nutrition (Griffin 1999). The conclusion is generally that public type goods should be provided or financed by governments, while private or near-private goods should generally be paid for by the consumers. The exception to this rule is normally stated to be for government provision of private type goods at times when the consumers are too poor to afford them.

The literature on decentralization has spent little effort determining the appropriate level of government to provide the public type services. In fact most of the recent focus has been on the advantages of local provision. As Silverman (1990) argues, local governments are more responsive to their citizens than is the central government. The notion is that when government decisions are made at levels of government closer to the actual individuals receiving the government services, the decisions will better reflect the demands of those people. Alternatively, it is suggested that the central government is less informed (or concerned) about local needs and special circumstances. As a result local provision will be more efficient. Such reasoning helps to explain the large number of countries which have devolved budget decisions to local governments in recent years. A recent survey of developing and transitional nations indicates that out of the 75 such economies with populations greater than five million, all but 12 claim to have embarked on some type of transfer of power to local governments (Dillinger, 1994).

Given this move towards decentralization, it is important to formally analyze some of the recent outcomes. Surprisingly little scientific evaluation has been undertaken, perhaps because the support of the policy has been so strong and little opposition or suggestion of possible shortcomings has been heard.[2]

In this paper we provide some preliminary evidence regarding the effect of decentralization on government health care provision. We begin by presenting a theoretical model of government resource allocation, which shows decentralization can lead to an increased government provision of private goods at the expense of public goods. This is because local governments ignore the spillover benefit of public goods to neighboring governments or are less subject to demands of international aid agencies who pressure for public goods projects. But perhaps more importantly, it is because when private type goods are allowed to be chosen, local citizens will behave rationally. They will reveal preferences for goods that most benefit them directly. Thus the argument goes that very decentralized provision of goods by governments, in which local citizens push for choices given a budget constraint, will often lead to a revealed preference problem similar to the one that leads to the necessity for public provision to begin with. Small governments will tend to vote to provide the goods for which citizens reveal preferences. They will therefore tend to spend on private goods type curative care clinic visits rather than on public goods type services such as health education and communicable disease control. Small governments may, therefore, behave too much like individuals, with the residents not revealing their preferences for public goods but in fact for private goods provided publicly. The hypotheses from the model, therefore, suggest that, in contrast to the conventional wisdom, decentralization of allocation decisions for services such as health care may in fact reduce societal welfare.

[2]One exception is West and Wong (1995) who consider the role of decentralization and the local provision of education and health services in China. However, they consider only aggregate provisions and not the mix of private versus public goods that we consider here. Also, they do not formally consider the relationship between provision levels and the extent of decentralization or trends in provision levels.

In order to empirically test some of the hypotheses of the model, we have assembled one of the first data-sets involving local fiscal behavior in a developing country. We collected three years of district-level data following the recent decentralization in Uganda, a sub-Saharan African country of just more than 20 million people. Field work was conducted in Uganda to collect health budgets from a sample of decentralized districts. These budgets provide extensive detail on the allocative decisions made by local government officials and the types of health activities –payment of salary bonuses, purchases of drugs and supplies, and provision of health education, community outreaches, and preventive and curative care – undertaken each fiscal year.

We find evidence that decentralization does tend to promote health spending on less public type goods at the expense of true public goods. Districts that have been decentralized longer spend a smaller proportion of their budgets on public goods activities relative to non-public goods activities. We also find evidence of one possible channel through which decentralization can reduce spending on public goods. There is a crowd-out effect caused by spillovers of benefits of public goods into neighboring areas: districts reduce spending on public goods when their neighbors spend more on public goods. In short, this study suggests that decentralized systems under-provide certain important public health services relative to a centralized system. A reappraisal of the central government's role in providing public goods in developing countries is called for.

The data from Uganda, however, do have limitations. These can largely be attributed to the limited capacity for data collection and development of new managerial structures associated with rebuilding a health sector that was largely destroyed in the 1970s and 1980s. The fact that decentralization is being undertaken concurrent with other changes in the health sector complicates but should not invalidate the analysis. The topic is of such importance – decentralization is ongoing in many developing countries concurrent with their own attempts to improve the effective supply of services – that it is hoped that these limitations can be overlooked in an attempt to initiate a debate on decentralization's impacts in developing country health sectors.

While our analysis focuses on the case of a developing nation, the same reasoning can be applied to developed countries. The possibility that decentralization promotes government provision of private goods at the expense of public goods would serve as a caveat for the recent trend towards policy devolution in the United States.

The outline of the remainder of the paper is as follows. Section 2 provides background on the literature and institutions in Uganda. Section 3 presents the theoretical model. Section 4 discusses the data while Section 5 contains the empirical results. Section 6 has a brief conclusion.

2. BACKGROUND

The economics literature on decentralization stems principally from work on fiscal federalism. The application of decentralization to health in developing countries has been evidenced primarily by the promotion of primary health care by major international donor organizations. Both the fiscal federalism and the primary health care proponents tend to propose greater local involvement by communities in governance and planning.

As argued in the fiscal federalism literature, provision of public goods is related to the size of the market defined by the public goods. The work by several authors (Tiebout 1956; Stigler, 1957; Oates 1972; Musgrave 1983) has argued that in cases in which local preferences differ across regions, decentralization can represent a Pareto improvement in welfare for the country's citizens. It is often argued that local governments are more likely than the central government to know local preferences for public goods and therefore be better able to equate the demand and supply of public goods and services (Silverman, 1990). Under decentralization, local populations could realize efficiency gains either by voting out local leaders whose actions did not satisfy their preferences or by moving to other areas where public services more closely matched their preferences (Litvack et al 1998).

Related to the fiscal federalism literature is more recent work on good governance which argues that decentralization accompanied by greater democratic participation in government can improve transparency and integrity (Thomas 1997). Other arguments used to support decentralization

include greater information about preferences, a reduction in the number of administrators, faster reaction times and a reduction in service duplication (Rondinelli, et al, 1983; Vaughan, 1990).

On the other hand, others have argued that decentralized systems, particularly those without well-functioning democratic systems, could lower local citizen welfare through a higher degree of corruption or "leakage" of resources than centralized systems (Prud'homme, 1995; Collins and Green, 1994; Bardhan and Mookherjee 1998 and 2000). Some (Tanzi 1996) have argued that imperfections in local provision of services may offset the potential benefits of decentralization. A full review of the advantages and disadvantages of decentralization are presented in recent surveys of the fiscal federalism literature (Inman and Rubinfeld, 1997; Oates, 1999).

There has not been a great deal of work which empirically evaluates decentralization in developing countries. Recent papers have found that fiscal decentralization has a negative association with economic growth in developing countries (Davoodi and Zou, 1998 and Zhang and Zou, 1998). Our work complements the latter work by suggesting a channel through which decentralization may decrease growth, namely by reducing government provision of public goods.

Other empirical analyses have examined the relationship between decentralization and the extent of corruption or rent-seeking behavior by private parties. Fisman and Gatti (2000), using cross-national data, find that decentralization is associated with lower levels of corruption, although no attempt is made to determine if the relationship is causal or simply associative. Other studies have split on the issue of decentralization and corruption. Wade (1997), using data from India, found that centralization was associated with higher levels of corruption in the irrigation sector; Brueckner (1999) found that corruption was more likely in local governments.

The impetus for decentralization in the health sectors in most developing countries stems from the encouragement by major international donors of public provision of primary health care. Policy documents such as the 1978 World Health Organization/UNICEF *Primary Health Care Declaration of Alma Ata* and the 1981 *Health for All by the Year 2000* stressed the importance of primary health care and the role of community participation in planning and providing health services

(World Health Organization 1978). As noted by several authors, promotion of primary health care was seen as incompatible with centralized systems of health care (Collins and Green 1994). However, equity concerns, rather than economic efficiency concerns, generally spurred these efforts.

In the health sector, there is little guidance in the literature regarding the most efficient level of production of health goods and services. The World Bank has argued that some tax-supported public goods such as immunizations and control of vector-borne diseases may need to be provided at relatively centralized levels in order for efficient production to be achieved. Other services, such as those provided directly to people in dispersed facilities, where there are user charges for drugs and curative care, may be better suited for decentralized provision. The World Bank's health financing policy paper (World Bank, 1987) listed decentralization of government provided health services as one of four reforms to be considered in most developing countries.

3. THEORETICAL FRAMEWORK

A. Model

It is important to develop a theoretical model in order to sort out the important factors and behaviors at play in determining levels of health services provided and to aid in interpretation of the empirical results. In particular we are interested in determining whether decentralization of responsibilities to local governments necessarily implies higher or lower relative levels of public goods provision. One objective in specifying the model is to specify how the demands of the local population affect the decisions of local and central governments so that the relative impact of individual demands in centralized and decentralized systems can be compared. To investigate the process we develop a stylized model of government. We compare outcomes when either a single policy-maker makes decisions for the whole country ("centralization") or different policy-makers make separate decisions for each local district ("decentralization"). In either case each policy-maker has a fixed amount of money which he or she must allocate between private goods which benefit particular individuals (such as curative health care) and public goods which benefit many individuals (such as sanitation or mosquito control). For realism we will presume the public good level can vary across local districts and that it chiefly benefits local

residents, although there is some spillover benefit to non-residents. For example, mosquito control will be most effective at reducing malaria incidence in the area where it is provided but it will also reduce cases elsewhere.

Each policy-maker is concerned about the well being of some group of citizens. Under decentralization, each district policy-maker tries to maximize the welfare of all or some subset of residents. For example, a district policy-maker might care about an influential group of cronies or alternatively if elected by majority rule might care equally about all residents. Under centralization, the national policy-maker maximizes the welfare of all or some subset of all residents in the country. As is standard in the literature, we assume that under decentralization local policy-makers control all local resources and can determine their allocation; similarly, under centralization the national policy-maker controls all resources and can determine their allocation. This assumption simplifies the analysis (because it means citizens make no decisions) but is not essential for any of the results below.

We suppose each individual *i* who lives in district *l* cares about his personal consumption of a single composite private good, X_{il}, as well as the level of the public good available. Due to our assumption regarding the local nature of public good provision, an individual benefits from the public good where he or she resides, G_l, and to a lesser degree from the public good in the other districts, $\beta \sum_{k \neq l} G_k$, where β is some number between 0 and 1 which measures the extent which public goods spillover to non-residents. Assuming for simplicity that each individual has separable preferences over the private and public good, then the individual's utility function may be written as,

$$U_{il} = U_1(X_{il}) + U_2(G_l + \beta \sum_{k \neq l} G_k)$$

where $U_1(.)$ and $U_2(.)$ are concave increasing functions.

We first consider the case where both the district and national policy-makers care equally about all of their residents (the "egalitarian assumption"). Then the objective function for the decentralized policy-maker in district *l* is,

$$W_l = \sum_{i \in l} U_{il}$$

while the objective function of the centralized policy-maker is,

$$W = \sum_l \sum_{i \in l} U_{il}$$

Each policy-maker seeks to maximize his or her objective function subject to the resource constraint. Under decentralization, the resource constraint in district l is,

$$\sum_{i \in l} X_{il} + p_G G_l = I_l$$

where p_G is the price of the public good in terms of the private good and I_l is the level of resources in district l. Under centralization, the resource constraint is,

$$\sum_l \sum_{i \in l} X_{il} + p_G \sum_l G_l = \sum_l I_l$$

In addition each local policy-maker assumes the level of public good provisions in the other districts is constant (the "Nash assumption"). Under these assumptions, the following result holds:

> **Proposition 1:** *Under egalitarian objective functions, decentralization unambiguously lowers the level of public good provision and individual welfare.*
>
> **Proof: See Appendix 1.**

This result follows because the local district policy-makers do not take into account the benefit their public good provides to non-residents while the centralized policy-maker explicitly considers such spillovers**.** The under-provision of public goods under decentralization has been hinted at in the early literature (Williams, 1966) and has been cited as a folk-result more recently (Gordon, 1983) though there does not appear to be a formal proof in the literature.

The result extends to three settings which are quite important in the context of developing countries (the proofs of these results are straightforward generalizations of the proof in the Appendix and are available upon request). First, suppose that the central policy-maker (but not the local policy-maker) also cares about the preferences of external donor organizations such as the World Bank or the World Health Organization. Because such groups tend to prefer that their funds be used for providing public

goods, the central policy-maker will have a bias towards providing public goods, possibly even at levels above the socially optimal level.

> **Corollary 1:** *If the central policy-maker is influenced by external donors who prefer spending on public goods, than decentralization unambiguously involves a lower level of public good provision.*

It is reasonable to assume that central policy-makers are likely to come in direct contact with donors and so are more likely to be influenced by their suggestions than are local leaders who do not often leave their home districts. Second, individuals typically are relatively more informed about their own benefit from health-oriented private goods than from health-oriented public goods. While a visit to the doctor has a tangible valuation, understanding the benefit of malaria spraying requires a more sophisticated understanding of disease transmission. These examples suggest that individuals may undervalue even their own benefit of health-oriented public goods. Decentralization will amplify this potential individual-level under-valuation of public goods because local governments are assumed to be more responsive to the preferences of individuals than is the central government. It is in this case that having a system that responds more closely to the demands of the people actually leads to a loss of welfare. If, as often seems to be the case, the local residents want the government to pay for private goods for them, rather than the more socially valuable public goods, it is the private goods that will tend to emerge from the representative government process.

> **Corollary 2:** *If individuals undervalue the public good and if local governments are more responsive to individual preferences than is the central government, then decentralization unambiguously involves a lower level of public good provision.*

Finally, the under-provision of public goods under decentralization extends to the more realistic case where the policy-makers care more about certain residents. In particular suppose that the objective function the decentralized policy-maker in district l is,

$$W_l = \mathring{a}_{i0l}\, a_{il} U_{il}$$

and the objective function of the centralized policy-maker is,

$$W = G_l G_{i0l}\ a_{il} U_{il}$$

The term a_{il} is the weight given to individual i in district l: higher values of a_{il} indicate that the policy-makers care more about this individual. Notice that the centralized and decentralized policy-makers use the same weights.

Corollary 3: *If the policy-makers have non-egalitarian objective functions, then decentralization unambiguously involves a lower level of public good provision.*

Interestingly, movements away from egalitarianism have an ambiguous effect on the difference in public good provision under centralization and decentralization. The effect of such shifts on the decentralized outcome is determined by the functional form of $U_1(X_{il})$ while there is typically no effect on the centralized outcome.

B. Testable Hypotheses

The model has several testable implications regarding both allocative efficiency and individual utility. In the case study for Uganda, we analyze District Workplan data from district government budgeting decisions over the last several years. Below we discuss the specific hypotheses we will analyze in this paper.

1. *Do health districts under fiscal decentralization allocate fewer funds to public goods type activities (primary health care activities, malaria control, control of communicable diseases, safe water supply, sanitation, health education, vaccination programs, nutrition, AIDS control, etc.) relative to private goods type activities (most types of curative health care and treatment of common noncommunicable diseases, building of health facilities, etc.)?* We will test this hypothesis by examining the expenditure patterns in the District Workplans. Based on categories to be outlined in the data section, we will compare resource allocation changes over time and attempt to apply behavioral content to the resource allocation decisions of local health planners.

2. *Are there spillovers in public good provision between districts?* The presumption of the benchmark model is that public goods but not private goods benefit residents in neighboring districts. This can be empirically tested using the Workplan data; in a regression explaining local public good provision, the level of public goods in neighboring districts should have a negative parameter. Alternatively, in a regression explaining government provision of private goods the level of government provided private goods in neighboring districts should not have a significant parameter.

4. DATA

The data for this analysis principally come from district annual health workplans compiled by decentralized districts in 1995-96, 1996-97 and 1997-98. The process of decentralization began in Uganda in 1993-94, when the central government devolved many functions and responsibilities, including the provision of basic health services and control over medical personnel, from the central Ministry of Health to the district level. Responsibility for hospitals, however, was not devolved to the district level, and plans are ongoing to allow hospitals to be semi-autonomous institutions.

The country is currently divided into 45 districts, each containing approximately 200,000 to 500,000 people.[3] The districts generally have at least one public sector hospital, supported by 10-15 health centers and 20-30 dispensaries (Ministry of Health 1997b).

A. Institutional Background

Districts receive funds for all health and non-health activities from three sources: local revenue, central government transfers and donors. Overall, central government transfers constitute the largest proportion, 81.3%, of district revenue. These are divided into an unconditional (block) grant

[3]The number of districts has been increasing over time as many districts have been sub-divided. In 1991, there were 33 districts. In 1995-96, there were 39 and by 1997-98 there were 45.

(18.7%) and a series of 17 conditional grants (62.6%). The latter are delegated for salaries of public sector workers, hospitals, road construction, and other central government priorities and cannot be reallocated by district planners. Throughout the decentralization process, both decentralized and non-decentralized districts have received conditional grants. Donors constitute an additional 12% of district revenue, although this proportion is considerably higher in the health sector. Local revenue makes up only 6.5% of district revenue (Ministry of Local Government 1999).

During the period of our analysis, several changes have occurred in the proportion of total district revenue from each of the above sources. Central government transfers and donor expenditures have both increased in absolute terms, while local revenue has decreased. The latter result reflects poor local tax collection capacities and imposition of new central government rules regarding local tax collection.

The unconditional block grants are allocated to decentralized districts based on a formula that includes district population, geographical size, infant mortality rate, and school age population. Presumably these characteristics are exogenous to the district decision-maker. The conditional block grants are targeted to particular spending categories such as health and education. In 1997-98, a conditional grant for primary health care was also established. Within the class of primary health care goods and services, local decision-makers still have leeway in whether they want to spend on public goods or other non-public goods.

Fiscal decentralization occurred in some districts before others. For our purposes, we define the initiation of decentralization with a district's receipt of the unconditional block grant (Table 1). Beginning in 1993-94, 13 districts received budgetary allocations directly through the Parliamentary Vote system, a precursor to full fiscal decentralization that channeled funds to the district level. In 1994-95, an additional 14 districts were put on the Parliamentary Vote system, while the original 13 districts received their funds as unconditional block grants. Funds received through these grants were no longer earmarked for specific areas and facilities. In 1995-96 the remaining 12 districts went on

the vote system, and in 1996-97 they, too, moved to the unconditional block grant (Local Government Finance Commission 1997).

We have little reason to believe that the potential endogeneity of which districts were decentralized first will bias our results. This is because the order of decentralization was unlikely to hinge on relative preferences for public versus private goods. Appendix 3 presents more formal evidence on selection issues.

TABLE 1

	No. of Districts on Vote System	No. of Districts on Block Grant System	Total No. of Districts in Country
1993-94	13		39
1994-95	14	13	39
1995-96	12	27	39
1996-97	6	39	45
1997-98		45	45

While there are some restrictions on spending, it is clear that districts have been given greater autonomy following the initiation of decentralization. Between the unconditional grant, local revenue, and flexible donor funding, districts are free to allocate between 25 and 60 percent of their total health revenue. That the districts have freedom to allocate a significant proportion of funds suggests that their budgeting behavior at the margin should reflect the patterns desired by the decision makers.

B. District Annual Health Workplans

We have collected fiscal data from a sample of decentralized districts in Uganda. These data represent a substantial effort in data collection and provide a rare opportunity to examine the behavioral decisions of local government health officials in a developing country. The data have been made available to the authors through the Project Coordination Office of the District Health Services Pilot and Demonstration Project financed by the International Bank for Reconstruction and Development (The World Bank). Development of workplan preparation systems in the World Bank project required several years of training in basic accounting and financial management systems at the

district level. Collection of the workplans was the product of innumerable workshops and visits to the country's widespread districts on an annual basis.

Health workplan data are currently available for fiscal years 1995-96 though 1997-98. In each year data are available only for districts participating in the decentralization program (see Table 1). The annual health workplans list all health activities which public sector health officials plan to undertake in a fiscal year. Examples include renovations or construction of health facilities, payment of supplementary salaries to district health workers, meetings with local officials, drug procurement and distribution, immunization activities, family planning, treatment of common illnesses, training, support supervision, etc. The workplans include line items for each activity, a time line for its undertaking, monitorable outcome indicators, sources of funding, and amount of funding.

In order to analyze the budget patterns of local government health officials, it was necessary to develop a methodology for categorizing the items included in the workplans.[4] The chosen methodology grouped activities into thirteen categories: primary health care; information, education and communication activities; drugs; civil works; equipment; vehicles; monitoring and evaluation; operations and maintenance; salaries; support supervision; supplies; training; and other. These categorizations were developed based on normative concerns within the District Health Services Project and the Ministry of Health that districts were disproportionately allocating resources to activities that improved the welfare of health workers or local politicians but had only minimal or

[4] Several categorizations were tried. Because the Ministry of Health initially used the data in an analysis of district burdens of disease relative to the cost effectiveness of health interventions, the first categorization grouped items into disease or health problem categories such as malaria, water and sanitation programs, or maternal and child health. This allowed for treatment of some interesting questions, such as whether under decentralization districts with higher malaria endemicity actually budgeted higher amounts toward combating malaria, but was of limited usefulness for examining other aspects of decentralization.

A second system of categorization focused on grouping interventions by the level of the health system at which they were provided primary, secondary and tertiary levels was tried. However, this was discarded because of incomplete data on hospitals, and because it was not possible to distinguish provision of services at the various levels health center, dispensary, sub-dispensary or aidpost. Preliminary estimations without district fixed effects attemted to control for the market share of hospitals, and hence the likelihood that district planners would allocate fewer resources to curative care, by including the number of hospitals in a district as a right-hand side variable. In none of the estimations was the hospital variable statistically significant.

very indirect impacts on the quality and availability of health services and the health of the population. Explicit descriptions of the components of each category are in Appendix 2.

A second categorization system aggregated specific types of activities by degree of "publicness" and contains implicit subjective judgments. Four categories were used: (1) public goods activities; (2) private or non-public goods; (3) support activities; and (4) other activities. The items contained in the "public" category included allocations for information, education and communication (IEC) activities; primary health care; and drugs. The IEC component is of an obvious public nature. Radio messages, community events, newspaper advertisements or signboards are generally both non-excludable and non-rival in consumption. A high proportion of the expenditure for drugs was for communicable diseases, such as basic childhood illnesses, sexually transmitted diseases or tuberculosis treatment. Provision of these drugs has important spillover benefits to non-recipients of the drugs. Many of the primary health care components - family planning, construction of pit latrines or bore-holes, distribution of insecticide impregnated materials – also have important public goods characteristics.

The second category – "non-public" – includes allocations to civil works, vehicles and equipment. While it was clearly recognized that all of the 13 types of interventions are necessary components of any health system, for many of these activities the benefits accrue (indirectly) not just to consumers but often (directly) more realistically to the health workers themselves. Supplemental salaries have obvious benefits for health workers. Training, as well, often involves payment of per diems for health workers, a valuable salary supplement particularly if government transfers are irregular. Vehicles are often used for personal transportation as well as official health business. Civil works – the construction of new clinics and very often new offices for senior district health management – are also necessary for public goods types of services, but most often are mainly used for providing curative care, the main benefits of which are to the direct recipients. Ideally, additional information on costs and effectiveness of facilities need to be available to determine their appropriateness. New clinics are very visible demonstrations of political commitment to health but

may be less effective than other uses of money, particularly given low levels of utilization at esisting facilities (Hutchinson 1999), and may not lead to higher levels of public goods or high externality producing goods.

Other components are less easily categorizable using this "publicness" criteria and are placed in two additional categories: support activities and other. Many activities of the District Health Team, such as supervision of health units and health workers, training of health workers, studies, payment of salaries, and maintenance of health equipment are necessary for the proper functioning of the health sector but are not directly categorizable as either public or private. "Other" is simply a catchall category for activities that did not fit in any of the thirteen subcategories. Because this last system of categories was believed to provoke the most debate, much of the analysis also uses the 13 categories listed above.

Several qualifications should be made regarding the workplan data. First, hospitals have been omitted from the analysis. This was because, while some district workplans included budget information for the hospitals, many districts did not, even though hospitals were present in the districts. This was a particular problem with respect to nongovernmental hospitals. It was decided that using the sample of districts for which hospital data were available would have reduced the sample size to an unusable level, as well as creating serious problems of sample selection.[5]

Second, direct transfers from the central government, for which information availability was not uniform across districts, were excluded to the extent possible. These direct transfers cover payment of regular salaries and in-kind transfers of drugs, supplies and equipment. Base salaries were excluded both because they do not appear in the workplans and because existing data from the

[5] Since local health planners do not currently control resources allocated to hospitals, it can be argued that hospital information is irrelevant to planners allocation behaviors. However, a fungibility argument could also be proposed; planners in districts with hospitals, or even strong private sectors, may have different allocation patterns because a share of the needs of their market is served by hospitals or private providers. To account for this possibility, all analyses were performed with control variables indicating the number of hospitals, both government and nongovernment, located in a district. Because very little information is available in the country on the extent of the private health sector, we are unable to control directly for its possible impact on budgets.

Ministry of Local Government do not distinguish salary transfers for health and non-health workers. The salaries component of the analysis therefore represents supplemental payments and bonuses enacted by local health planners for activities of health workers outside their normal scopes of work. However, these levels should be similarly determined across districts –a reflection of population and the number of health facilities. As a result, all items listed in the workplans reflect activities over and above provision of basic inputs such as staff, drugs, equipment and supplies in the health facilities. Excluding these figures in fact presents a potentially more interesting question: given identical base inputs from the central government, what do districts do with their funds in order to supplement their health systems? We assume here that, as in most cases of expenditure analyses, it is the spending at the margin that provides the most information about preferences.

More explicit descriptions of the various sub-categories are contained in Appendix 2. The most important point in our minds is that the "public" category is indicative of public goods expenditures and not of "private" ones. That this category grows or recedes would seem to be strong evidence of a growth or reduction of budgeting to public goods in a district, even if some public goods spending is missed and included in the non-public category.

Because district annual workplans did not exist prior to decentralization, before and after comparisons in a pseudo-experimental fashion cannot currently be undertaken. The focus of this analysis will be to examine trends in resource allocations for districts after they are given the flexibility of decentralized decision-making.

While these data are not perfect, they are by far the best data available to examine spending behavior of local governments in a poor country under decentralization. That strong patterns of change are observed after decentralization tends to validate our view of the worth of the data.

C. Other Data Sources

Data on sources of revenue are extracted from reports from 1994-95 through 1998-99 by the Decentralization Secretariat of the Ministry of Local Government. Data on district per capita incomes are derived from national household surveys conducted in 1994, 1995 and 1997 by the Statistics

Department of the Ministry of Planning and Economic Development. Per capita income is computed as total household income divided by the number of members of the household. Averages for this per capita income variable are computed for each district for each year (Ministry of Local Government 1996, 1997 and 1999).

5. EMPIRICAL FRAMEWORK

For our empirical framework, our dependent variables are the shares of budgets allocated to the categories outlined above. We focus on budget shares rather than other measures such as per capita figures to be consistent with the theoretical model. This is because secular trends in total spending – due to preference, population or income changes – can dominate spending levels. That is, if overall government spending is increasing rapidly due to an infusion of donor aid, spending on public goods could still increase though at a slower rate than on private goods.

All dependent variables used in this analysis are represented by continuous variables. Ordinary Least Squares estimation methods are therefore used. The explanatory variables are intended to control for district preferences and needs, budgeting flexibility, costs of activities, and extent of decentralization.

The chosen set of variables includes two measures of decentralization: years since receipt of the unconditional grant and proportion of the local government budget financed by local sources. The proportion of expenditure from subnational levels has been used in several works to indicate the level of decentralization (Fisman and Gatti 2000; McPhail 1999). The years since decentralization variable is intended to reflect the hypothesis that districts take time to reallocate resources to suit their local needs and preferences. Our maintained presumption in this paper is that there are frictions in the policy-setting process so that spending is not instantly changed to reflect environmental changes. This means that in the first year a district is added to the decentralization program its spending will actually be closely related to how it would behave under centralization. As more time elapses, it will gradually adjust its spending towards the new optimum given a decentralized state.

The years since decentralization variable is distinguished from time trends by having separate dummy variables for each fiscal year (1995-96, 1996-97, 1997-98).

District per capita incomes were included to control for the overall level of resources in a district and for factors such as human capital and education that could affect how district planners chose to allocate resources.

The allocation of resources to specific components of the local government budget is therefore given by:

$Alloc_{it}$=f(years decentralized, fiscal year, district per capita income, proportion of the budget from local sources, district fixed effects)

where i= district i=1...45 and t = fiscal year 0, 1 or 2.

All estimations are undertaken in Stata.

6. RESULTS

In this section, we use the empirical data from the district health budgets, combined with secondary data sources, to examine the following questions:

1. Whether decentralized districts exhibit preferences towards provision of public goods relative to other types of activities.
2. Whether districts will attempt to "free ride" on the public goods provided by their neighbors. Districts with neighbors that expend large amounts on public goods may attempt to reduce their own public goods production accordingly.

A. District Allocations to Public and Private Goods over Time

Our data support the hypothesis that districts alter the budget shares of public goods and other types of health activities during the decentralization process. Table 2 shows the budget shares for different types of workplan activities categorized by their degree of publicness. Between 1995-96 and 1997-98, the overall budget share allocated to our public goods category of health activities decreased from nearly 50 percent of the total budget to around 30 percent of the total budget. The largest decrease was for primary health care activities such as provision of family planning materials, malaria

control or maternal and child health, all activities with high degrees of publicness. This category decreased from nearly one-third of the budget to only 15.6 percent of the budget. The budget share for drugs also decreased slightly, from 13.4 percent to 8.0 percent. Interestingly, the share of spending on the highly public category of Information, Education and Communication activities doubled from 3.1 percent to 6.5 percent.

On the other hand, the proportion of the budget allocated to non-public goods activities – civil works, equipment and vehicles – increased from 16.4 percent to 27.3 percent of the budget. The largest increase was for civil works activities – construction of new offices and clinics – which increased from 8.7 percent to 16.0 percent. Other categories with significant benefits to health workers showed changes. Salary bonuses increased from 8.8 percent of the budget to 11.7 percent. Training, which often includes payment of per diem bonuses, remained relatively unchanged. Even given the problems of categorization inherent in the data, these patterns so strongly indicate a movement of resources out of highly public activities into brick, mortar and staff amenities that the conclusion is obvious. Resources seem to be flowing away from societal benefit goods toward the kinds of expenditure that benefits health sector managers and employees.

A few positive results were also noted. The share of the budget allocated to monitoring and evaluation of activities increased from less than 1 percent to 3 percent. Support supervision activities also increased slightly from 2.9 percent to 4.5 percent.

TABLE 2. AVERAGE DISTRICT SPENDING BY CATEGORY, 1995/96 - 1997/98
(SAMPLE: DECENTRALIZED DISTRICTS WITH AVAILABLE WORKPLANS)

Type of Activity	**1995-96**	**1996-97**	**1997-98**
Primary Health Care	32.9%	21.5%	15.6%
Information, Education & Communication	3.1%	7.9%	6.5%
Drugs	13.4%	9.9%	8.0%
Total Public	**49.3%**	**39.3%**	**30.1%**
Civil Works	8.7%	13.2%	16.0%
Equipment	5.1%	7.2%	9.0%
Vehicles	2.5%	3.1%	2.3%
Total Private	**16.4%**	**23.5%**	**27.3%**
Monitoring & Evaluation	0.9%	2.5%	3.0%
Operations & Maintenance	2.8%	2.6%	3.5%
Salary	8.8%	6.8%	11.7%
Support Sup.	2.9%	3.7%	4.5%
Supplies	4.2%	3.5%	4.2%
Training	13.5%	16.6%	13.9%
Total Support	**33.0%**	**35.7%**	**40.8%**
Other	**1.3%**	**1.6%**	**1.8%**
Total	**100.0%**	**100.0%**	**100.0%**
No. of Districts	**13**	**19**	**29**

Ordinary least squares estimations of the effects of important covariates were undertaken on eight budget share dependent variables: three public goods activities (primary health care, drugs, and IEC) and the public goods aggregate (public); two types of private goods (civil works and vehicles) and the private goods aggregate; and allocations to salary bonuses. [6]

These estimations support the hypothesis that districts allocate fewer resources to public goods type activities – including primary health care– as they progress further into the decentralization process. For all of the public health categories except IEC, the coefficient on the years since decentralization variable is negative. For primary health care, this result is strongly statistically significant, and for the all public goods category the t value is 1.43. Only in the IEC estimation, for which the coefficient on years since decentralization is positive and significant, is the

[6] Fixed and random effects estimations were also undertaken. Hausman tests found no statistically significant differences in the coefficients between the two methods and hence the absence of correlation between the right-hand side variables and the district unobservables, thereby indicating the desirability of conducting the random effects estimation. However, Breusch-Pagan Lagrange Multiplier tests found that random effects were not statistically different from zero. As a result, the estimations presented here are simple Ordinary Least Squares estimations with robust standard errors to control for non-independence of district observations across time. The random effects

time trend variable statistically significant. Even though, for each of the categories of private goods the coefficients for the years since decentralization and the year 1997 dummy variable are not statistically significant, except in the estimation of allocations to vehicles, all four of the signs are positive, indicating that the private spending share has gone up in the years since decentralization..

Results for other variables are also of interest. The proportion of revenue from local sources does not appear to have an impact on allocations for any of the dependent variables except vehicles. Districts with higher per capita incomes are less likely to allocate resources to drugs and more likely to allocate resources to IEC activities.

The result on Information, Education and Communication is intriguing since, as noted above, it is opposite in sign to the prediction. This result may be related to the nature of many health education activities in Uganda. Much health education is very localized, targeted "community sensitization" of community and religious leaders regarding specific health issues, as opposed to radio, newspaper or other media messages, which are more common at the national level. This form of health education, while perhaps more appropriate for districts, may be easily targeted to favored groups or regions, and may in practice often be more akin to a private than a public good activity. The result for monitoring and evaluation is likely the result of centrally mandated studies and data collection activities.

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estimations are included in Appendix 5.

TABLE 3. ORDINARY LEAST SQUARES ESTIMATIONS – SPECIFIC CATEGORIES OF PUBLIC AND PRIVATE GOODS

Independent Variables	Public		Primary Health Care		Drugs		IEC	
	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Years since decentralized	-0.043	-1.430	-0.049	-2.000	-0.008	-0.380	0.014	2.950
Year= 1997	-0.021	-0.480	0.018	0.420	-0.018	-0.710	-0.021	-1.660
Pct. Local Revenue	0.137	0.800	0.141	0.830	-0.023	-0.180	0.020	0.700
Per Capita Income	-0.030	-1.040	0.000	0.010	-0.047	-2.090	0.017	2.180
Intercept	0.526	6.040	0.299	4.020	0.225	3.380	0.003	0.280
Obs.	50		50		50		50	
F(4,18)	2.48		2.79		3.12		11.77	
R-Squared	0.2366		0.2087		0.1285		0.2599	
Clusters	19		19		19		19	

Independent Variables	Private		Civil Works		Salary		Vehicle	
	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Years since decentralized	0.003	0.160	0.002	0.220	0.015	1.300	0.005	1.600
Year= 1997	0.036	0.900	0.036	1.170	0.017	0.950	-0.012	-1.400
Pct. Local Revenue	-0.088	-0.970	-0.054	-0.750	0.003	0.090	0.025	1.240
Per Capita Income	-0.005	-0.200	-0.011	-0.630	0.008	0.500	-0.007	-0.800
Intercept	0.238	4.030	0.144	3.430	0.028	1.140	0.029	1.700
Obs.	50		50		50		50	
F(4,18)	1.06		1.33		2.02		1.41	
R-Squared	0.0656		0.1056		0.1261		0.0682	
Clusters	19		19		19		19	

B. Spillovers

This section examines the possibility that districts might reduce their public goods provision due to a spillover from neighboring districts provision of public goods. Such spillovers could help explain some of the negative relationships between decentralization and public good provision found in the last section. These spillovers were also posited in the theoretical model.

We examine several independent variables intended to measure the extent of spillover effects from neighboring districts onto a planner's district:

1. Average public goods budget shares of neighboring districts
2. Average per capita public goods expenditure of neighboring districts
3. An instrumental variable for average public goods budget share in neighboring districts
4. Average private goods budget share of neighboring districts
5. Average per capita private goods expenditure in neighboring districts

We again use Ordinary Least Squares with robust standard errors to estimate our model.[7] One complication is that neighbor spending may be endogenous as a result of being determined along with that of the district in question as part of an overall Nash equilibrium. To account for this, we consider a two-step estimator in which we first consider the effect of neighboring district's characteristics on own spending. These parameters are used to form an index, which can be used to measure the spillover effect.

Estimations are only for fiscal years 1996-97 and 1997-98. In 1995-96, too few districts had contiguous neighbors for whom we had available workplans and the resultant public goods expenditure data. Because they do not cover the full analysis period, the spillover estimations shown here have been separated from the earlier estimations.

[7] The same justification is used for these estimations. Hausman tests justified random effects estimations but tests of random effects showed that these were not statistically different from zero. Results for the random effects estimations are included in Appendix 6.

The results support the hypothesis that spillovers affect neighboring district spending decisions, although the absolute magnitudes of the effects are small (Table 4). In all of the models, the coefficients on neighbors' public goods expenditures are negative and statistically significant, including the model with the instrumental variable for neighbors' public goods budget share. [8] The results indicate that districts with neighbors who spend a high amount on public goods reduce their own public goods expenditure accordingly. Districts seem to act as free riders to a degree, and spend less on their own public goods when neighbors provide public goods from which they can benefit.

Similarly, there is evidence of switching between public and private goods based on the behavior of neighboring districts. In model (5), the statistically significant results indicate that districts spend more on private goods if their neighbors spend a higher proportion of their budgets on public goods. That the results show no evidence that districts spend more on private goods if their neighbors spend more on private goods, suggests that the results are in fact a result of the free riding on public goods phenomenon that we hypothesize (Model 6). This is obviously in accord with the theoretical model, which contains no mechanism through which private goods spending in a district will lead to decreases in private goods spending for neighboring districts.

[8] In this model, a Rivers and Vuong test for the endogeneity of neighbors public goods expenditure fails to accept the hypothesis that unobservable factors affect both own public goods expenditures and neighboring districts public goods expenditures. The Rivers and Vuong test involves including both the actual value of neighbors public goods budget share and the predicted residuals from the first stage equation in the equation for own district public goods allocations. Significance for the predicted residuals in the second stage supports the hypothesis that unobserved factors affect both own public goods budget shares and neighboring districts public goods budget shares.

TABLE 4. FIXED EFFECTS ORDINARY LEAST SQUARES ESTIMATIONS OF PUBLIC GOODS SPILLOVERS

Independent Variables	Budget Share Public Goods								Budget Share Private Goods			
	Coef.	t	Coef.	t	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Neighbor's Budget												
Public goods budget share	-0.010	-5.060							0.003	1.490		
Public exp. Per capita			-0.009	-3.260								
Private goods budget share					-0.010	-4.730						
I.V. Public Goods Budget Share							-0.011	-3.570				
Private Exp. Per Capita											-0.014	-0.300
Years since decentralized	-0.013	-0.520	-0.016	-0.600	-0.013	-0.490	-0.014	-0.520	-0.020	-0.790	-0.018	-0.810
Pct. Local Revenue	0.233	1.090	0.232	1.120	0.231	1.090	0.223	1.060	-0.248	-2.830	-0.280	-2.350
Per Capita Income	-0.010	-0.530	-0.014	-0.720	-0.010	-0.520	-0.008	-0.410	-0.031	-1.380	-0.033	-1.640
Intercept	0.394	4.730	0.419	5.090	0.391	4.640	0.405	4.850	0.392	3.970	0.414	4.280
Observations	37		37		37		37		37		37	
Clusters	19		19		19		19		19		19	
R-Squared	0.141		0.131		0.140		0.147		0.148		0.149	
F(4,18)	25.48		4.94		25.09		6.99		4.13		3.64	

7. CONCLUSION

The assumption that decentralization of government decision-making to the lowest level practicable is in the best interest of the people is widespread in the development literature. Decentralization is so well accepted that most of the literature on decentralization is focused on how to carry it out rather than on whether it actually increases social welfare. We have discussed and formalized a conceptual model that leads to questioning of the widely held assumption that decentralization necessarily increases social welfare We suggest that, for reasons including inter-district spillover benefits of public goods and that central governments tend to be more likely to listen to non-biased expert advice favoring the provision of public goods, decentralization may in fact lead to a substitution of publicly financed private goods for public goods.

The empirical results paper are supportive of this hypothesis that there is a negative impact of decentralization on public goods provision. They indicate that in Uganda local governments and health planners are allocating a declining share of government health budgets to public goods activities relative to private goods. This impact seems to be grow as districts have been decentralized longer. We also find evidence of a specific mechanism affecting district allocation patterns; districts alter their public goods budget mixes based on the public goods activities of neighboring districts. Spillover effects do seem to lead to free riding by districts on the health budgets of their neighbors.

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APPENDIX 1: PROOF OF PROPOSITION 1

First consider the decentralized outcome among M districts. In district l the vector of individual private good and the public good is set by the program,

$$\text{Max}_{X1l\ldots XNl,\, G1} \; \mathring{a}_{i \hat{I} l} U_{il}$$

$$\text{st} \; \mathring{a}_{i \hat{I} l} X_{il} + p_G G_l = I_l$$

The first order conditions for district l imply that all N residents consume the same level of private goods, X_l (the proof can be readily extended to the case where each district has a different number of residents). The first order conditions also imply that,

$$\underline{N \P U_2(G_l + \$ \mathring{a}_{k \neq l} G_k)/\P G} = p_G$$

$$\P U_1((I_l - p_G G_l)/N)/\P X$$

Now under the Nash assumption the public good level of the remaining districts, G_k, is presumed to be fixed. This means the equation above characterizes the reaction function, $G_l(\mathring{a}_{k \neq l} G_k)$. This reaction function is unique because the equation above has numerator which is decreasing and a denominator which is increasing in G_l.

A *decentralized Nash equilibrium* $G^*_1 \ldots G^*_M$ satisfies the system of M first order conditions listed above. An equilibrium will exist so long as p_G and $\P U_1/\P X$ are bounded and $\lim_{G \to \infty} \P U_2(G)/\P G = \infty$. The equilibrium will also be unique. This can be shown by starting at some equilibrium, considering some new level of public good provision for $m \pounds M$ districts, and then showing that at least one of the first order conditions must be violated. For example, consider when districts 1 and 2 change their level of public good. Without loss of generality say $G_1 > G^*_1$ and $G_2 < G^*_2$ (when both increase or decrease their public good level then the first order conditions in both districts must fail). If the new vector of public goods weakly increases $G_2 + \$ \mathring{a}_{k2} G_k$ then it strictly increases $G_1 + \$ \mathring{a}_{k1} G_k$. Because $X_l = (I_l - p_G G_l)/N$ must decrease when G_1 increases, this means the first order condition in district 1 must fail. A similar

contradiction holds in district 2 when $G_1+\$\sum_{k1} G_k$ weakly decreases. Finally, if $G_1+\$\sum_{k1} G_k$ increases and $G_2+\$\sum_{k2} G_k$ decreases then the first order conditions in both districts must fail. Since this exhausts all of the possible cases, this shows that it is not possible to have an equilibrium which is identical to $G^*_1 \ldots G^*_M$ except in two districts. This argument can be repeated inductively to include changes in any number of districts.

Now it is possible to show that increasing the public good provision in each district above the decentralized Nash equilibrium level is pareto improving. To see this, say that in district l the level of each of N resident's private good is decreased by $e_l>0$ (where $e_l \to 0$) and so the level of public good increases by Ne_l/p_G. Also presume for now that there are no changes in the other districts. By the envelope theorem this small change in the control variable will not change aggregate welfare in district l. More formally, the change in utility for a resident i in district l is,

$$DU_{il} = [U_1(X^*_l-e_l) + U_2(G^*_l+ Ne_l/p_G+\$\sum_{kl} G^*_k)] - [U_1(X^*_l) + U_2(G^*_l+\$\sum_{kl} G^*_k)]$$

Taking a first order Taylor expansion and using the equilibrium condition for district l, this equation reduces to,

$$DU_{il} \approx 0$$

This approximation is valid so long as $e_l \to 0$. For a resident j in district $k \neq l$ this change increases his utility due to the public good spillover. More formally, substituting in the change and taking a Taylor expansion yields,

$$DU_{jk} \approx \$e_l \, \partial U_1(X^*_k)/\partial X$$

so the overall change in welfare among all individuals is,

$$DW_l = N\$e_l \sum_{kl} \partial U_1(X^*_k)/\partial X$$

which is positive since $e_l>0$. This process could be repeated in each of the remaining districts. When each district increases its public good provision a bit, then all individuals are made strictly better off and the overall change in welfare is,

$$DW \approx \sum_l DW_l = N \sum_l \$e_l \sum_{kl} \partial U_1(X^*_k)/\partial X$$

Notice that these expressions also show that a small reduction in public good provision reduces each individual's welfare.

Finally, it remains to show that the centralized optimum must involve a higher aggregate level of public good. Recall that the centralized decision-maker maximizes the average welfare of all citizens subject to the overall resource constraint,

$$\text{Max}_{X11\ldots XNM,\ G1\ldots GM}\ \sum_l \sum_i \int_l U_{il}$$

$$\text{st}\ \sum_l \sum_i \int_l X_{il} + \sum_l p_G G_l = \sum_l I_l$$

The above results show that the centralized optimum cannot involve a lower level of public good provision in all districts. The centralized first order conditions imply that the public good provision in each district must be identical (intuitively this follows since all districts are identical and receive equal weight in the maximand). Call this level G. The first order conditions may be written,

$$\frac{(1+\$(M-1))N\ \partial U_2((1+\$(M-1))G)/\partial G}{\partial U_1((\sum_l I_l - Mp_G G)/NM)/\partial X} = p_G$$

The solution, G^*, to this equation is unique because the numerator is decreasing and the denominator is increasing in G. Now suppose that the centralized public good level is the mean of the decentralized levels, $G' = M^{-1}(G^*_1 + \ldots + G^*_M)$. This results in higher aggregate welfare than the decentralized outcome. To see this, consider the change in welfare of an individual i in district l,

$$\Delta U_{il} \approx [(1-\$)\Delta G_l\, p_G + \Delta X_l]\ \partial U_1(X_l)/\partial X$$

where Δ indicates the change relative to the decentralized outcome and a first order Taylor expansion and $\Delta G_l = -\sum_{k \neq l} \Delta G_k$ are used. The change in aggregate welfare relative to the decentralized outcome,

$$\Delta W \approx \sum_l [(1-\$)\Delta G_l\, p_G + \Delta X_l]\ \partial U_1(X_l)/\partial X$$

must be positive since: $G_l > G_k \rightarrow X_l > X_k$ (from the decentralized first order conditions); $\Rightarrow$ $DG_l > DG_k$ ($DG_l < DG_k$)$\rightarrow$ $DX_l > DX_k$ ($DX_l < DX_k$)(again from the first order conditions); $\Rightarrow$ $\P U_1(X_l)/\P X < \P U_1(X_k)/\P X$ (since $X_l > X_k$).

Finally, a small uniform increase above the average level in public good provision in each district will be pareto-improving following the reasoning in the last paragraph. Alternatively, a reduction in public good provision is pareto-inferior. This shows that the centralized optimum must satisfy $G^* > G'$ which means that the public good level is higher than under the decentralized outcome. It also shows by revealed preference that aggregate welfare is improved under the centralized outcome.

QED

APPENDIX 2. TYPES OF DISTRICT ANNUAL WORK PLAN INTERVENTIONS

Type	*Description*
Civil works	New construction of physical structures, Rehabilitation, Renovation
Drugs	Purchases of supplemental Vaccines and other drugs
Equipment	Purchase/"procurement" of durable goods (refrigerators)
Information, education, and communication	Home-visiting for education and awareness-raising, community sensitization and mobilizations, drama groups, radio and newspaper messages
Monitoring and evaluation	Routine monitoring of health situations (outcomes), communities; scientific studies; Health Management Information System
Maintenance	Operations and maintenance, utilities' expenses, day-to-day running of District Medical Officers' offices
Other	Meetings at district or community level, library, management, study tours, travel, transport, District Medical Officer office work
Primary health care	Delivery of preventive and basic curative services to secondary level or below, end products (Vitamin A, constructing wells, pit latrines, distribution of family planning supplies, procurement of Insecticide Impregnated Materials, growth monitoring, outreach to AIDS patients, Maternal and Child Health**)**
Salary	District Medical Officer's office salaries and allowances, other health staff salaries, incentives and allowances (excludes salaries and allowances for hospital staff since health unit staff are excluded)
Support supervision	Support supervision of District Medical Officer's office to district health workers or of central Ministry of Health personnel to District Medical Officer's office; monitoring and evaluation of health workers and process indicators (audits, performance reviews)
Supplies	Semidurable goods (uniforms, chemicals, office supplies)
Training	Health workers' courses and refresher courses
Vehicle	Purchase of vehicles, motorcycles

APPENDIX 3. SELECTION ISSUES

Since much of the analysis examines the effects of decentralization on allocation of resources over time, it is legitimate to wonder whether a selection process is occurring in which districts that were decentralized earlier are different in important ways from districts that were decentralized later. We find little evidence of such differences. Table A3.1 shows the means and standard deviations of important district characteristics for districts categorized by the year in which they were decentralized.

TABLE A3.1. MEANS AND STANDARD DEVIATIONS FOR DISTRICTS BY YEAR IN WHICH THE DISTRICT WAS DECENTRALIZED

	1993		1994		1995	
Indicator	Mean	S.D	Mean	S.D	Mean	S.D
1996 Population	725,415	243,073	517,936	244,870	255,291	151,802
Population Growth	2.61	0.38	2.97	1.99	2.01	2.04
Pct. of Population Under 5 years	18.7	1.0	18.9	1.8	18.5	1.8
Pct. of Females aged 15-49	44.2	2.3	45.8	4.0	44.6	3.0
Pct. Of Population in Urban Areas	10.3	6.3	12.3	25.4	4.5	2.8
Total Area	6,565	4,042	6,186	4,604	6,139	4,596
Development Indicators						
Average Per Capita Income	205,495	62,534	205,044	128,009	167,980	80,923
Pct. of Population with Latrines	73.2	21.2	67.6	28.0	54.0	23.9
Pct. of Population with Safe Water	25.1	18.4	30.8	19.1	18.6	15.5
Literacy Rate	55.7	8.1	52.4	12.7	43.4	18.0
Female Literacy Rate	46.6	12.6	42.0	16.8	34.9	18.7
Health Indicators						
Life Expectancy at Birth	48.02308	3.380126	48.42143	4.285069	46.97273	3.857225
Crude Birth Rate	51.9	2.523886	52.88571	3.276221	51.36364	4.53724
Crude Death Rate	17.5	2.3	17.0	2.9	18.3	2.6
Infant Mortality Rate	124.4	22.0	118.6	21.4	126.0	17.2
Total Fertility Rate	7.2	0.6	7.2	0.8	7.1	0.8
Health Infrastructure						
(a) Facilities						
Government Hospitals	1.6	0.7	1.2	0.6	1.0	0.6
Government Health Centers	35.8	9.5	26.9	17.6	16.1	5.4
(b) Staff						
Government Hospital Staff	199	99	203	380	69	45
Government Health Center Staff	206	77	128	84	83	45
Field Staff	25	17	19	11	15	9
Total Staff	453	173	382	480	177	73
No. of Observations	13		14		11	

More formal evidence on this point is presented in Table A3.2. These multinomial logit estimates compare districts decentralized in 1994 and 1995 – as defined by the year in which they

first received a unconditional block grant – with districts that were decentralized in 1993. The factors that are examined reflect general characteristics (1996 population, population growth, and total area) and levels of development (average per capita incomes from 1995-1997, the infant mortality rate, the total fertility rate, the percentage of households with latrines, and the percentage of the population living in urban areas). The base category for the analysis is districts that were decentralized in 1993.

The principal difference is that districts that were decentralized in 1993 were larger in population than later districts. While size may correspond to important unobservable characteristics such as the quality of administrative structures, there is little reason to suppose that such differences should influence the relative level of public goods.

TABLE A3.2. DEPENDENT VARIABLE = YEAR OF DECENTRALIZATION (BASE=1993)
HUBER-WHITE STANDARD ERRORS

Independent Variables	1994 Coef	1994 Robust S.E.	1994 T	1995 Coef	1995 Robust S.E.	1995 T
Pct. of Population in Urban Areas	0.075	0.059	1.275	-1.152	0.589	-1.956
District Population	-0.327	0.198	-1.652	-1.653	0.538	-3.073
Infant Mortality Rate	-0.072	0.026	-2.836	0.112	0.085	1.307
Total Fertility Rate	1.142	1.060	1.077	-1.010	1.361	-0.742
Total District Area	0.000	0.000	1.221	0.000	0.000	-0.714
Average Per Capita Income	-1.384	1.154	-1.200	2.288	2.178	1.050
Pct. of Population with Latrines	-0.009	0.029	-0.297	-0.062	0.047	-1.329
Intercept	4.311	7.215	0.598	6.360	12.381	0.514
Obs.	67					
Wald chi2(7)	65.9					
Prob>chi2	0					

A second form of selection could be present in the data as a result of incomplete collection of district workplans (Table A3.3). Workplans are not available for all districts because the data were collected only for districts financed under the International Bank for Reconstruction and Development project, whose coverage of the country was expanding from 1995-96 onwards. Other districts fell under the auspices of different donor organizations from whom workplan information was generally unavailable. For fiscal years 1995-96 and 1996-97,

there are workplans for approximately half of the decentralized districts, and for fiscal year 1997-98, for two-thirds of decentralized districts.

TABLE A3.3. AVAILABILITY OF WORKPLANS

Fiscal Year	No. of Workplans Available	No. of Decentralized Districts
1995-96	12	26
1996-97	19	39
1997-98	30	45

Table A3.4 presents probit estimates comparing districts for which workplans are available with districts for which they are unavailable. Few important differences were noted. Districts in the sample are somewhat more populous, and slightly smaller in area, than districts not in the sample. For other important variables, health outcomes and district income, no significant differences are observed.

TABLE A3.4. DEPENDENT VARIABLE = AVAILABLILITY OF WORKPLAN (INCLUSION IN OUR SAMPLE OF DISTRICTS)
HUBER-WHITE STANDARD ERRORS

Independent Variables	Coef	Robust S.E.	T
Pct. of Population in Urban Areas	-0.047	0.038	-1.240
District Population	0.164	0.068	2.421
Infant Mortality Rate	-0.006	0.014	-0.463
Total Fertility Rate	-0.120	0.260	-0.461
Total District Area	0.000	0.000	-1.976
Average Per Capita Income	-0.084	0.321	-0.263
Pct. of Population with Latrines	-0.013	0.009	-1.448
Intercept	2.695	2.858	0.943
Obs.		121	
Wald chi2(7)		9.82	
Prob>chi2		0.199	

APPENDIX 4.

In addition to budget shares, the allocation patterns for districts can also be examined in terms of per capita budget figures (Table A4.1). Overall, district budgets increased in real terms by approximately 90 percent over the three years of the study from $2.77 per capita to $5.21. Some categories increased by less than the overall increase. Allocations to public goods activities increased by only 16 percent from $1.34 per capita to $1.56 per capita. Allocations to private goods increased by 200 percent from $0.52 to $1.52 per capita. Allocations to primary health care actually decreased, from $0.93 to $0.82 per capita. Other categories showed considerable jumps. Civil works and equipment increased by over 200 percent. In 1995-96, the amount spent on civil works in 1997-98 was one-third that spent on primary health care; in 1997-98 they were nearly identical. The amount allocated to salary bonuses increased by 139 percent.

TABLE A4.1 AVERAGE PER CAPITA DISTRICT SPENDING BY CATEGORY, 1995-96 – 1997-98(SAMPLE: DECENTRALIZED DISTRICTS WITH AVAILABLE WORKPLANS)

Type of Activity	1995-96	1996-97	1997-98	1995-96 - 1996-97	1996-97 - 1997-98	Total Change
Primary Health Care	0.93	0.88	0.82	-6%	-6%	-12%
Information, Education & Communication	0.10	0.31	0.36	210%	15%	258%
Drugs	0.31	0.47	0.38	53%	-20%	22%
Total Public	**1.34**	**1.65**	**1.55**	**23%**	**-6%**	**16%**
Civil Works	0.28	0.61	0.87	119%	43%	213%
Equipment	0.16	0.35	0.53	128%	49%	240%
Vehicles	0.09	0.14	0.12	69%	-19%	36%
Total Private	**0.52**	**1.11**	**1.52**	**113%**	**37%**	**192%**
Monitoring & Evaluation	0.02	0.11	0.15	388%	38%	573%
Operations & Maintenance	0.06	0.12	0.16	86%	41%	162%
Salary	0.24	0.26	0.56	11%	115%	139%
Support Sup.	0.08	0.15	0.20	86%	34%	149%
Supplies	0.10	0.15	0.19	52%	27%	93%
Training	0.36	0.67	0.77	88%	15%	117%
Total Support	**0.86**	**1.46**	**2.04**	**70%**	**40%**	**138%**
Other	0.05	0.06	0.10	21%	65%	100%
Total	**2.77**	**4.28**	**5.21**	**55%**	**22%**	**88%**

APPENDIX 5. RANDOM EFFECTS ESTIMATES OF ALLOCATIONS TO PUBLIC AND PRIVATE GOODS ACTIVITIES

Independent Variables	Public		Primary Health Care		Drugs		IEC	
	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Years since decentralized	-0.046	-1.548	-0.053	-1.991	-0.009	-0.469	0.014	2.272
Year= 1997	-0.016	-0.305	0.026	0.540	-0.018	-0.499	-0.021	-1.664
Pct. Local Revenue	0.124	0.954	0.147	1.241	-0.047	-0.520	0.020	0.634
Per Capita Income	-0.023	-0.567	0.007	0.203	-0.047	-1.754	0.017	1.992
Intercept	0.519	6.554	0.293	4.082	0.231	4.359	0.003	0.167
sigma_u	0.069		0.059		0.037		0.000	
sigma_e	0.127		0.116		0.088		0.030	
rho	0.229		0.207		0.146		0.000	
Observations	50							
Number of groups	19							
Hausman Test chi2(4)	0.85	0.9315	1.72	0.7862	3.95	0.4124		
Test u=0 chi2(1)	1.31	0.2528	2.05	0.1518	1.19	0.2762	0.26	0.608

Independent Variables	Private		Civil Works		Salary		Vehicles	
	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Years since decentralized	0.012	0.461	0.008	0.460	0.015	1.194	0.006	1.169
Year= 1997	0.024	0.537	0.030	1.003	0.017	0.641	-0.014	-1.416
Pct. Local Revenue	-0.074	-0.696	-0.040	-0.570	0.003	0.045	0.028	1.189
Per Capita Income	-0.003	-0.091	-0.005	-0.238	0.008	0.427	-0.008	-1.063
Intercept	0.216	3.137	0.121	2.621	0.028	0.800	0.028	1.943
sigma_u	0.068		0.046		0.000		0.013	
sigma_e	0.101		0.066		0.065		0.023	
rho	0.311		0.326		0.000		0.243	
Hausman Test chi2(4)	3.43	0.4884	5.2	0.2669			2.06	0.725
Test u=0 chi2(1)	0.99	0.3196	0.88	0.3486	0.18	0.6693	1.22	0.27

APPENDIX 6. RANDOM EFFECTS ESTIMATIONS OF SPILLOVERS

Independent Variables	Budget Share Public Goods								Budget Share Private Goods			
	Coef.	t	Coef.	t	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Neighbor's Budget												
Public goods budget share	-0.006	-0.882							0.002	0.363		
Public exp. Per capita			-0.004	-0.682								
Private goods budget share					-0.006	-0.882						
I.V. Public Goods Budget Share							-0.007	-0.969				
Private Exp. Per Capita											-0.039	-1.276
Years since decentralized	-0.027	-1.185	-0.029	-1.293	-0.026	-1.165	-0.027	-1.200	-0.013	-0.610	-0.007	-0.324
Pct. Local Revenue	0.185	1.031	0.182	1.014	0.183	1.025	0.178	0.999	-0.200	-1.163	-0.245	-1.449
Per Capita Income	0.004	0.104	0.002	0.066	0.004	0.115	0.006	0.175	-0.042	-1.344	-0.055	-1.722
Intercept	0.404	4.560	0.418	4.657	0.402	4.515	0.410	4.623	0.391	4.825	0.453	4.587
sigma_u	0.070		0.071		0.071		0.072		0.061		0.070	
sigma_e	0.085		0.085		0.085		0.086		0.088		0.074	
rho	0.403		0.410		0.410		0.417		0.327		0.476	
Observations	37		37		37		37		37		37	
Groups	19		19		19		19		19		19	
Hausman Test chi2(4)	4.24	0.37	4.49	0.34	3.92	0.42	3.48	0.48	1.51	0.83	7.94	0.09
Test u=0 chi2(1)	1.20	0.28	1.18	0.28	1.27	0.26	1.21	0.27	1.10	0.29	1.53	0.22